

# Carbon Sequestration Research Opportunities



**2005 ESPCoR Conference**  
***Morgantown, West Virginia***

**Sarah Forbes**  
**May 15, 2005**

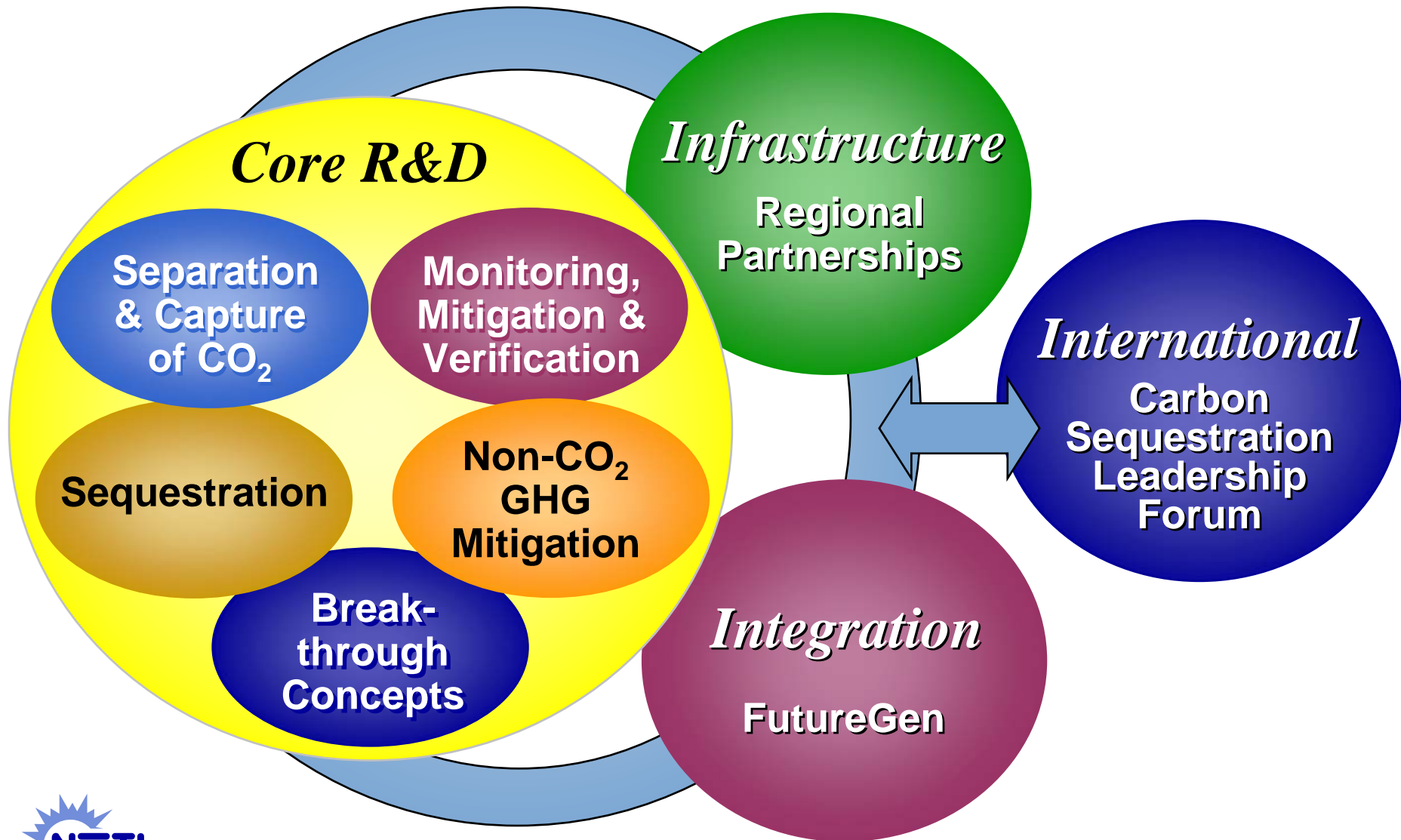
***National Energy Technology Laboratory***



**Office of Fossil Energy**

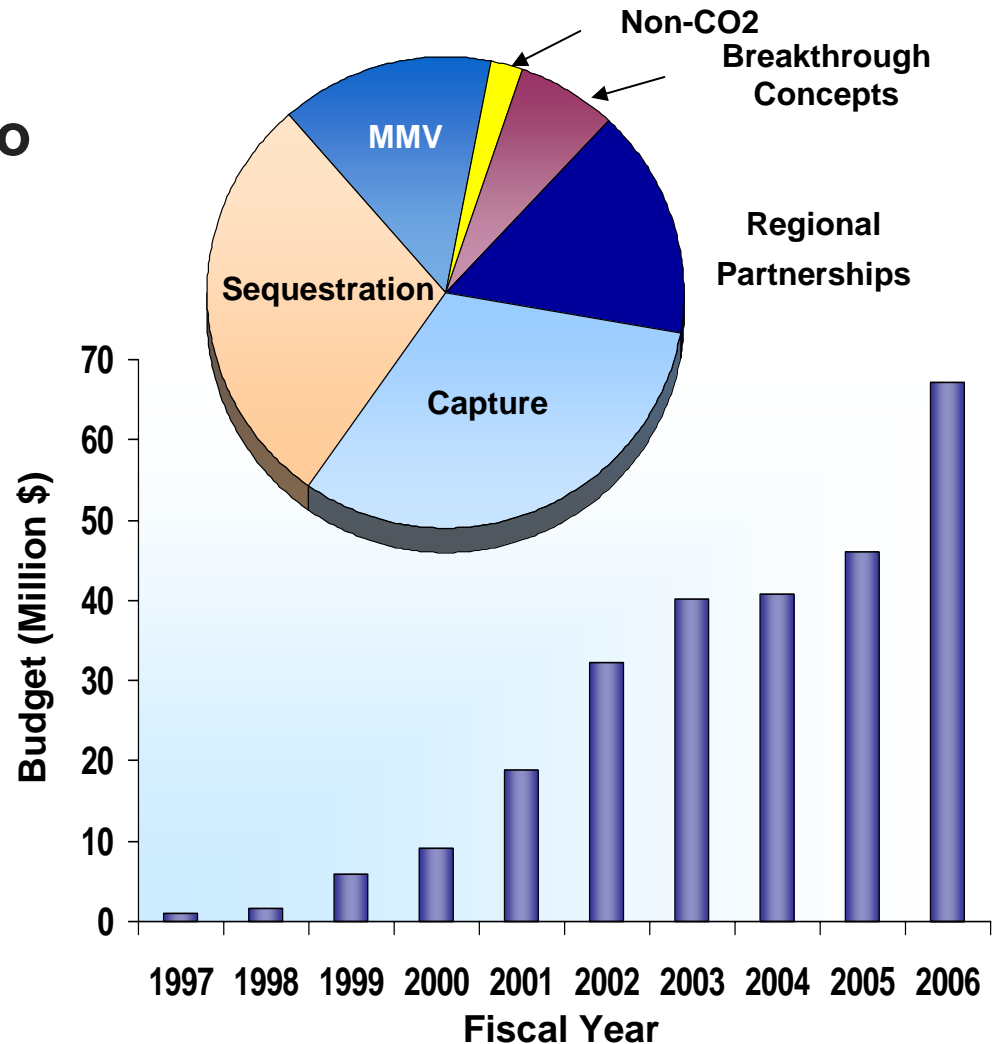


# U.S. DOE/ Fossil Energy Program Organization



# Portfolio Overview – FY2005

- **Diverse research portfolio**
  - ~ 60 R&D Projects
  - IEA & CCP consortia
- **Strong industry support**
  - ~ 36% cost share
- **Portfolio ~ \$200 Mil**
- **Administration Priority**
  - ~ 50% increase in 2006 budget request



# 2005 Programmatic Highlights

- **2005 Sequestration Roadmap and Project Portfolio Available**
- **Programmatic Environmental Impact Statement**
  - Draft EIS to be released Summer FY05
  - Second round of public hearings to be held
- **Sequestration Educational Curriculum**
  - Middle school curriculum developed
  - High school curriculum under development
  - Teacher training sessions offered



# 2005 Highlights

## *Capture*

- **Post-combustion:**  
25% reduction in net steam use  
for amine-based CO<sub>2</sub> capture
- **Pre-combustion:**  
New technologies offer a cost  
of CO<sub>2</sub> capture 33-38% below  
conventional selexol/amine
- **Oxy-fuels:**  
Pilot-scale experiment  
demonstrated a 70% reduction  
in CO<sub>2</sub> recycle



# 2005 Highlights

## *Storage*

- **Geologic:**

- Successful injection of 1,600 tons of CO<sub>2</sub> in a domestic saline formation
- Increased understanding of CO<sub>2</sub> trapping mechanisms

- **Terrestrial:**

80% survival rate for tree plantings on abandoned mine lands

- **Ocean:**

Dense CO<sub>2</sub>/water hydrate formed in laboratory tests at MBARI



# 2005 Highlights

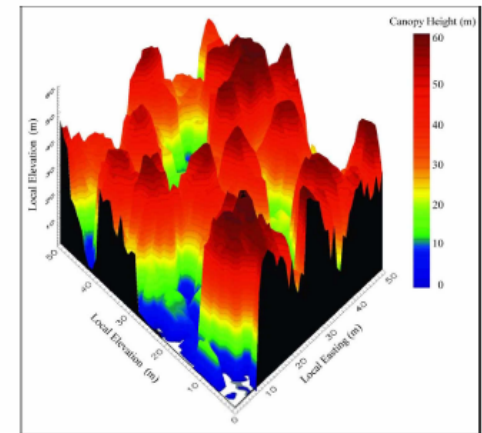
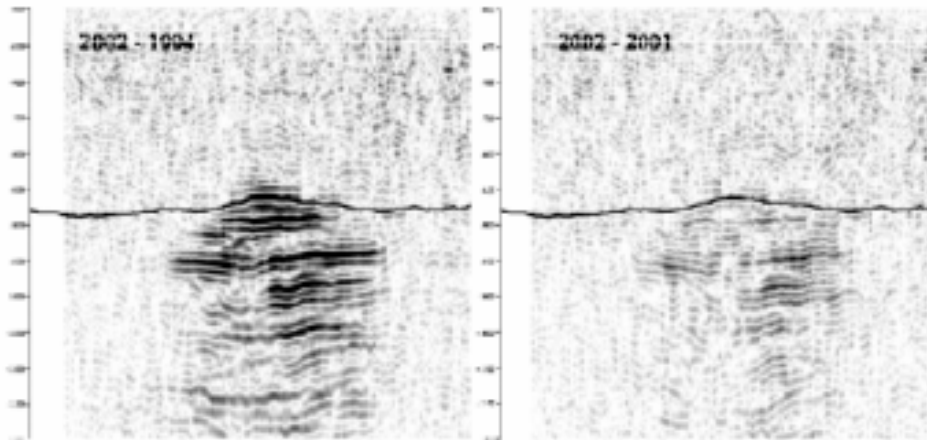
## *Monitoring, Mitigation, & Verification*

- **Geologic:**

Time lapse seismic able to detect volumes of CO<sub>2</sub> as small 2,500 metric tons

- **Terrestrial:**

Initiated work to explore the next generation terrestrial MM&V technologies





# 2005 Highlights

## *Non-CO<sub>2</sub> GHG Mitigation*

- **Expanded project portfolio to from 2 to 5 field projects**
  - Kansas landfill capture followed by ECBM recovery
  - Landfill microbial methane reduction
  - Landfill cover
  - Intelligent Bioreactor Management System for Landfill
  - Coalmine methane capture and reuse





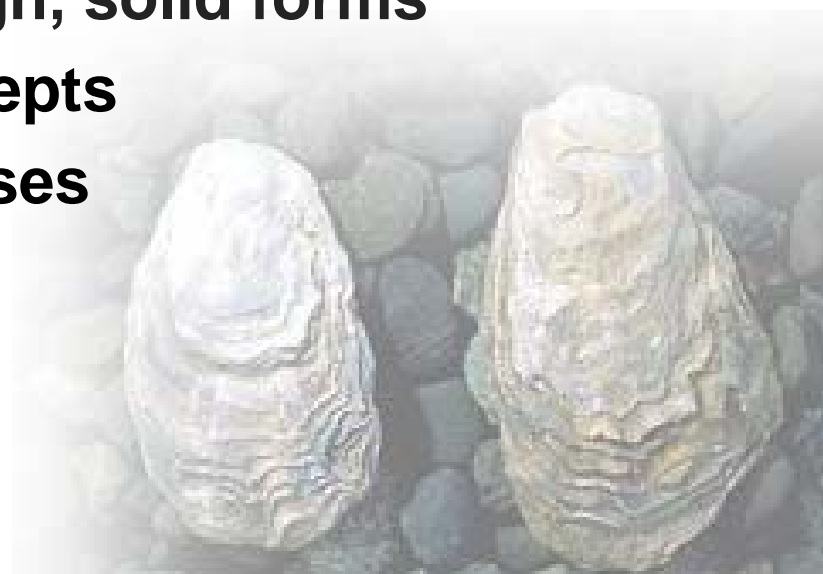
# Breakthrough Concepts

## Technology Goal

- 2007 - Identify lab scale technologies capable of meeting 10% increase COE 2012 goal

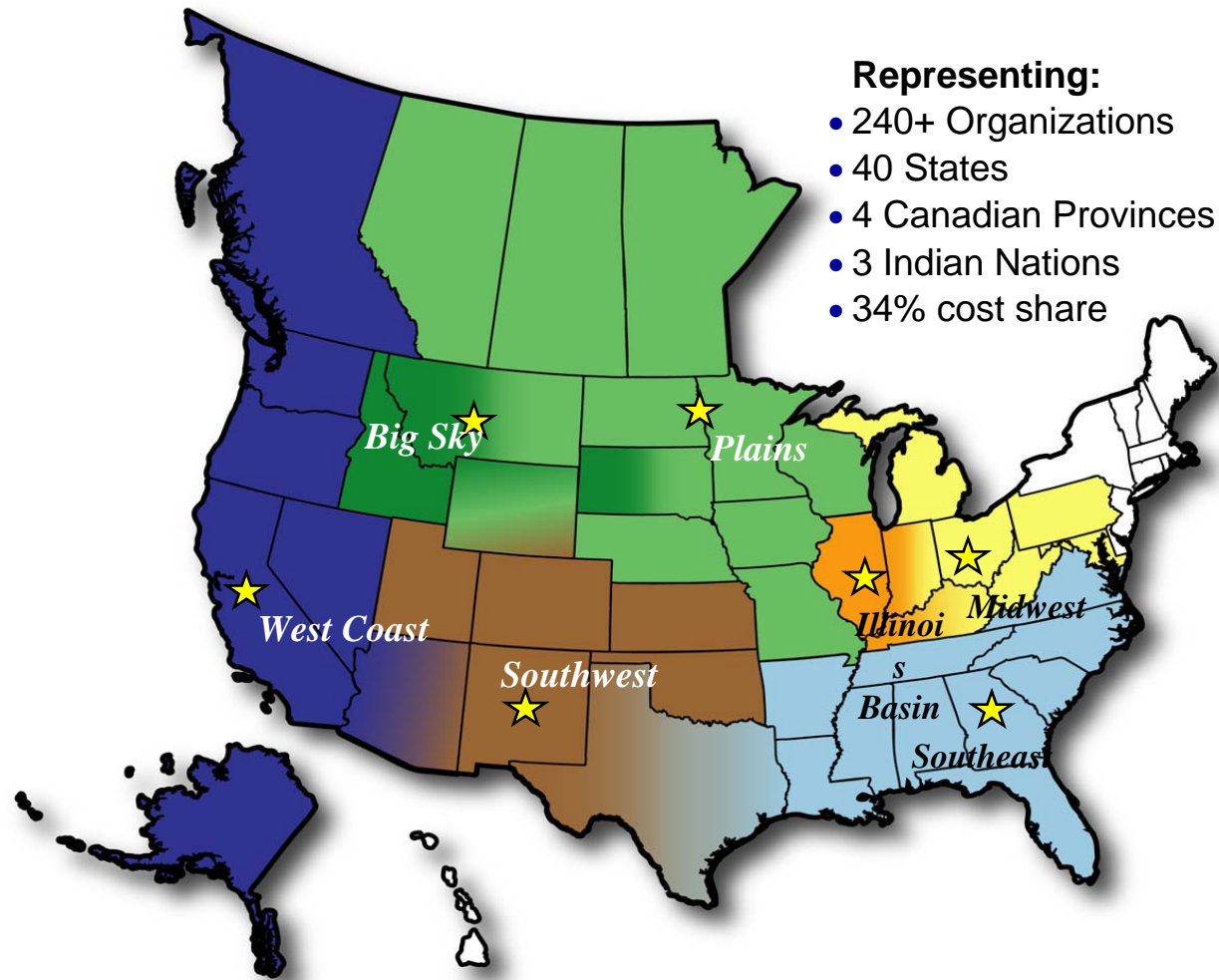
## Pathways

- CO<sub>2</sub> conversion to benign, solid forms
- Advanced capture concepts
- Biogeochemical processes



# Regional Carbon Sequestration Partnerships

## *Infrastructure Required for Wide Scale Deployment*



# Capture and Separation Solicitation Recently Announced

- **Validation Tests of Separation Technologies**
  - Slip-stream
- **Areas of interest**
  - Oxyfuel Combustion
  - Post-combustion Capture
- **Anticipate \$13.5M Total Federal funding**
  - 20% minimum non-Federal cost share

